

REMARKS

Applicants appreciate the courtesy shown by the Examiner in granting the interview on July 23, 2003. Applicants submit that the below remarks, along with the attached declaration from Dr. Espiell, address all outstanding issues regarding the patentability of the present invention.

I. The Present Invention

It was previously deemed undesirable for melt copper alloys to contain a lead content in excess of 15-20 ppm. Higher lead amounts were believed to reduce electrical conductivity and cause defects. See Application, page 1, lines 23-28. Applicants have found that copper starting-materials containing impurities in amounts of the order of tens of weight parts per million (ppm) mixed with at least 200 ppm of lead can be continuously cast to produce a copper microalloy with a low number of voids and bubbles.

Applicants respectfully note that the present invention consists not simply of an alloy defined by a given composition of Cu and other alloying components. Rather, it reflects the discovery that the addition of a certain percentage of lead (i.e., at least 200 ppm) to a copper alloy allows the alloy to be continuously cast without breakages . Under this process, bars of copper to be used for electrical conductors can be obtained, obviating reliance on electrolytically-refined copper processes.

II. Rejections Under 35 U.S.C. § 103

A. Rejection over JP ‘050

Claims 5, 7-12, 14, 15, 17-19, 21 and 22 stand rejected as obvious over JP 62133050 (JP '050). JP '050 discloses a copper alloy necessarily containing 0.1-5.0 wt% of both Sn and Ti (1000-50,000 ppm), while only optionally containing lead. The '050 strip product's electrical conductivity was 30% of IACS and is suitable for use as a spring.

1. JP '050 Does Not Teach or Suggest All of the Claim Limitations

JP '050 does not teach or suggest every limitation of the present invention. Independent claims 5, 9, 15, and 19 recite mixing a copper alloy that "contains Zn, Fe, Ni, Sn, and Ag impurities in amounts of the order of tens of weight ppm" (emphasis added). The processed alloy in JP '050 contains 1 to 50 thousand ppm of Sn. JP '050 discloses significantly larger amounts of impurities, and does not teach a copper alloy having impurities in amounts of the order of tens of weight ppm.

The Examiner alleges that the instant claimed elements all have open ended ranges. Applicants respectfully submit that under the broadest reasonable interpretation, "amounts of the order of tens of weight ppm" of impurities, including Sn, cannot be construed to encompass compositions having at least a thousand weight ppm of tin (along with other impurities). As thus illustrated, the instantly claimed elements do not have open ended ranges.

Furthermore, the larger magnitude of impurities found in JP '050 does not represent an obvious variation in starting material, as the differences result in two fundamentally different materials. The larger magnitude of impurities in JP '050 prevent the alloy from being sufficiently electrically conductive. As set forth in the attached declaration by Dr. Espiell, the present invention's composition complies with standards requiring a minimum electrical conductivity of 100% IACS. Dr. Espiell states that the higher amounts of Ti and Sn used in JP '050 "can not achieve in any case values close to 100% IACS". See Exhibit A, paragraphs 8-9.

2. A Person of Ordinary Skill in the Art Would Not Be Motivated to Consult JP '050 to Arrive at the Present Invention

The method of the present invention provides an alloy for electrical conductors. Applicants have found, in contrast to conventional wisdom, that a copper alloy with lead amounts of 200 ppm (by weight) or higher allows for continuous casting processing. As shown in Dr. Espiell's declaration of April 1, 2003, the amount of lead is critical; cracks and breakages occurred with lead concentrations of 182 and 196 ppm, whereas a lead concentration of 208 ppm yielded a microalloy exhibiting no cracks or breakages. See Exhibit B, paragraphs 5 and 9.

A person of ordinary skill, without benefit of applicant's disclosure would have no idea that copper alloys mixed with 200 or more ppm of lead exhibit less tendency to break when continuously cast. Based on JP '050, the skilled artisan has no motivation to focus on lead concentrations; JP '050 only optionally uses lead. In contrast, Dr. Espiell explains that lead (in an amount of 200 ppm or greater) is a necessary ingredient for producing a microalloy suitable for continuous casting.

Further, a person of ordinary skill seeking an electrically conductive copper microalloy would look to references in compliance with the universal standards for such alloys. ASTM standards B224-98 ("Standard Classification of Copper") and B49-98 ("Standard specification for Copper Rod Drawing Stock for Electrical Purposes") require a conductivity of at least 100% IACS and a copper content of 99.90%. As stated by Dr. Espiell (Exhibit A, paragraphs 8 and 9), the alloys set forth in JP '050 fail to comply with these standards.

B. Rejection Over JP '050 in View of Applicants Allegedly Admitted Prior Art

Dependent claims 12 and 14 stand rejected as obvious over JP '050 in view of applicants' allegedly admitted prior art. The Examiner, based on page 2, second paragraph of the present application, states that it is known [that] heating at 550-650°C for over an hour would have the effect as claimed." Claim 12 recites that the "hydrogen content of the microalloy is 0.5-0.7 weight ppm after casting". Claim 14 recites that "the electrical conductivity of the microalloy is increased to values greater than 101% IACS". Without conceding the Examiner's assertion of acknowledged prior art, applicants respectfully note that these limitations are not found in page 2, second paragraph of the present application.

Furthermore, the statements on page 2, second paragraph of the present application do not teach the missing limitations described in section II.A.1 above, or provide the motivation to consult JP '050 to arrive at the present invention, as described in section II.A.2 above. As the independent claims 5, 9, 15, and 19 are unobvious over JP '050 in view of allegedly acknowledged prior art, the obviousness rejection of claims 12 and 14 should also be withdrawn.

III. Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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Respectfully submitted,

By

Jay P. Lessler

Registration No.: 41,151

DARBY & DARBY P.C.

P.O. Box 5257

New York, New York 10150-5257

(212) 527-7700

(212) 753-6237 (Fax)

Attorneys/Agents For Applicant